

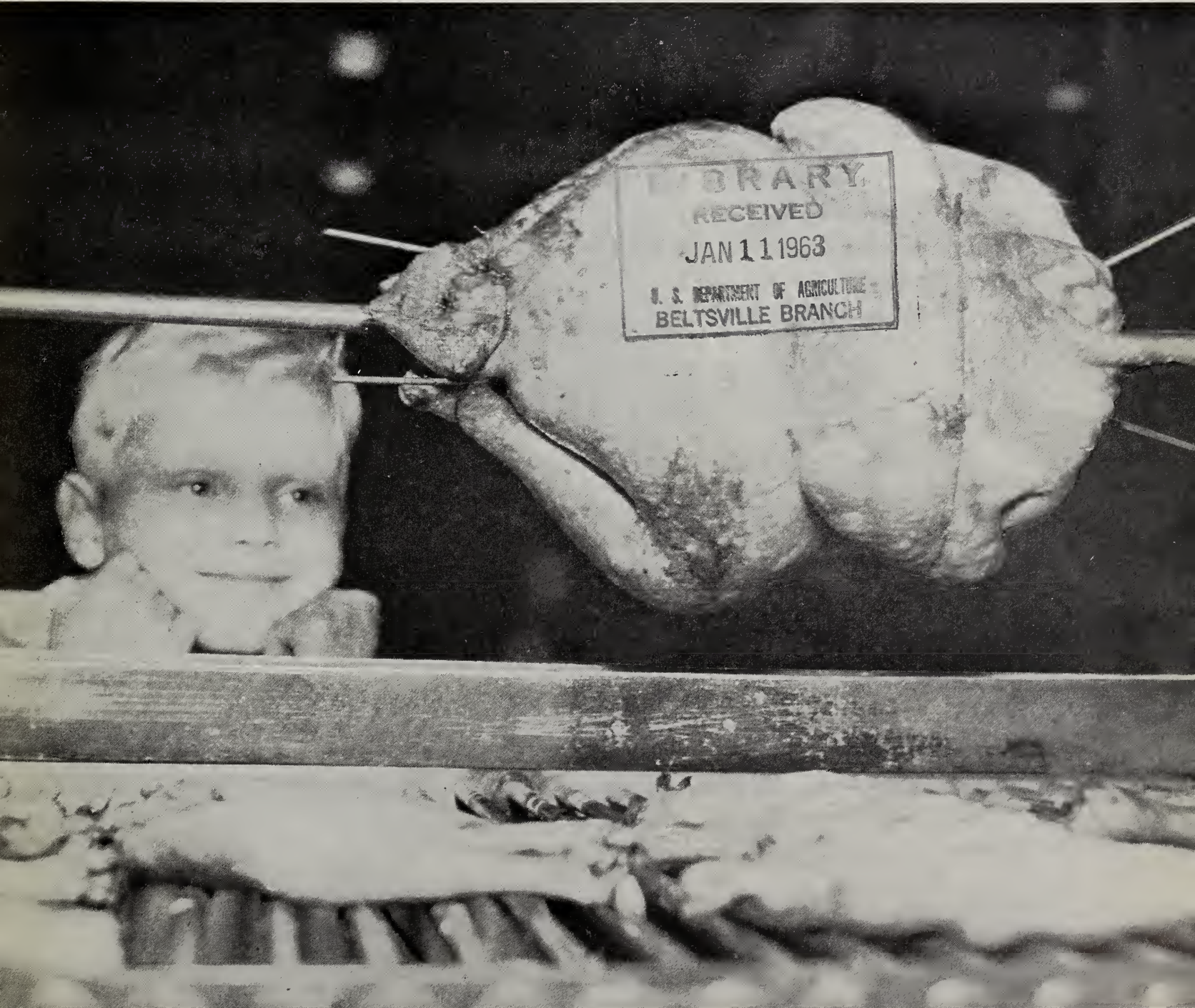
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OCTOBER 1962

agricultural marketing





Volume 7, Number 10

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Secretary of Agriculture

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Contents

October 1962

A Better Market for Pigs	3
New Laboratory Aids Poultry Inspection	7
Improved Methods for Eviscerating Chickens	8
Plant Disease Control Without Chemicals	10
Packaging Cheese in Stores and in Central Warehouses	12
Packing Potatoes under Continuous U.S.D.A. Inspection	14
New Products Increase Potato Consumption	15
Food Stamp Program Offered to New Areas	16

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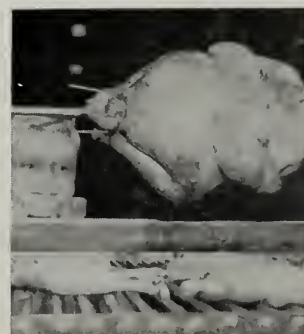
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Cover page

In this picture the eyes definitely have it—the eyes of a Belgian youngster devouring this sumptuous American turkey, a highlight of this autumn's United States food exhibit in Brussels. Today American turkey is winning the hearts of Belgian housewives and their families, a result of the U.S. export trade promotion.

This exhibit was the first all-food show ever staged in Belgium under U.S. Government auspices. Sponsored by USDA's Foreign Agricultural Service, in cooperation with the U.S. food industry, the one-acre exhibit in Brussels was the largest of all this year's USDA-sponsored food exhibits. About 100 firms participated, displaying as many as 700 different products. In recent years U.S. agricultural exports to Belgium have averaged about 130 million dollars annually. And last year, Belgium was the seventh largest "dollar" market for our farm products.

Editor, MILTON HOFFMAN



AGRICULTURAL MARKETING is published monthly by the Agricultural Marketing Service, United States Department of Agriculture, Washington 25, D. C. The printing of this publication has been approved by the Bureau of the Budget, March 18, 1959. Yearly subscription rate is \$1.50, domestic; \$2.25, foreign. Single copies are 15 cents each. Subscription orders should be sent to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

A Better Market for Pigs

IT WAS a hot day in May.

A touch of breeze over the South Virginia landscape did little to relieve the perspiring farmhands of the heat, but carried with it the refreshing odor of honeysuckles and the gentle murmur of passing bees.

Marvin Whitley, Courtland, Va., looked over the fence as a farmhand trained a fine spray of water over the heads of the 50 or so feeder pigs being prepared for shipment to the Courtland Feeder Pig Sale.

He knew his pigs were good ones and he was proud of it. But he also knew they were better-quality pigs because of the Courtland sale, for this experimental auction market had given him, and producers like him in Southern Virginia, the incentive to produce higher-quality pigs.

This he could be proud of, too, for he had been one of the early supporters of the Courtland sale.

With Marvin at his loading dock was Horace Mackey, another man who had been with the Courtland sale from the beginning. Mackey is a swine marketing agent with the Virginia Agriculture Department's Market Expansion Section and was one of two men who inspired the Courtland feeder pig sales.

The other man who helped initiate these sales was E. A. (Red) Davis, Southampton County Extension Agent, who, cooperating with county agents in six surrounding counties and with the State Agriculture Department, helped develop a market system in Virginia which added \$73,000 to feeder pig producers' incomes during 1961 alone.

Marvin Whitley's pigs were being cooled down for the journey by truck to Courtland for the sale.

And they were ready to go to market.

First they had been farrowed and fed under the best scientific conditions.

Also they had been vaccinated six weeks prior to sale to conform to Federal interstate commerce requirements.





C. T. Barns (right), supervisor of the Virginia grading section grades a "Virginia No. 1" feeder pig by spraying it with a can of blue paint. Below, two prospective buyers at the Courtland sale examine a lot of 100-pound Virginia No. 1 feeder pigs prior to the auction sales. Buyers often come from as far north as New England to purchase stock.



And they had been carefully sorted to insure that only the better pigs went to the Courtland market.

Marvin could remember a time when this hadn't been done. These were the years prior to 1957, the years of the "five-dollar" feeder pig and the 30-percent mortality—when the producer got small payment for his pigs, and the buyer lost many of them before they could be finished and sold.

It was in 1957 that the Virginia Department of Agriculture started doing something about the problem.

It started with a series of hog sales featuring graded, healthy hogs—to provide an economic incentive to producers and feeders to raise better quality hogs by providing a better price for them.

This led to the problem of producing better-quality feeder pigs that could be fattened into high-grade slaughter hogs. So the project which would eventually be the Courtland sale was started.

The first problem encountered was that of grades at the time it was generally conceded that feeder pig grades were an impossibility, since such grades would be nothing more than a prediction of what a pig would eventually grade as a slaughter hog.

And how could you develop a grade which would accurately predict a grade?

Fortunately, no one told C. T. Barns, supervisor of the Livestock Grading Section, Division of Markets, Virginia Department of Agriculture, that such grades were impossible, and he and his staff set about determining feeder pig grades.

Tentative grades were established by Barns' section after a series of tests with feeder pigs, and after consultation with Lowell Strong and others in the Standardization Branch of the Livestock Division of AMS.

These grades are currently being tested, through feeding trials and carcass evaluation, by the State Experiment Station. Previous field tests have shown, according to S. Hollis Shomo, Director of the Virginia Department's Division of Markets, an 87 percent correlation between the Virginia feeder pig grades and the USDA slaughter hog grades. These studies were conducted on graded feeder pigs followed through to slaughter.

Virginia feeder pigs are graded number I, II, Medium, III, and Cull. The Number I pig is determined by its "ruggedly refined" character.

Into a large truck, and onto a truck bed covered with dampened, sweet-smelling hay, the pigs began the six-mile drive to market.

Whitley and Mackey followed the truck to Courtland—Mackey to begin his part in the two days of rigorous work in grading and sorting which always preceded the auction sale.

At the market—a small, tree-surrounded pavilion constructed by area producers—the pigs joined nearly 1,600 others from over the area in what was to be the largest feeder pig sale of its type ever held.

The first graded feeder pig sale was conducted in Courtland in 1958. This unique type of sale has continued monthly in Courtland since that time and has served as a model operation for the other six feeder pig sales in Virginia.

Marvin's pigs joined an elite group of feeder pigs in Courtland, for only the top three grades can be sold through the pavilion—Virginia grades I, II, and Medium. Grade III and Cull pigs brought to the market are rejected and must be taken back to the farm.

At the pavilion, the pigs were unloaded into pens leading to the grading area. In the grading pen, C. T. Barns and an assistant carefully graded each pig and marked it with can spray paint to identify it by grade.

Blue paint marked the Grade I pig; red, a Grade II; yellow, Medium grade. A few of 1,600 pigs were marked with a green pigment, for Grade III. These pigs were rejected for the sale.

After the grading, the pigs were sorted into groups of like grade. They were then sorted by like size within each grade and sent to the scales for weighing.

From the scales all pigs, regardless of ownership, were grouped into large lots of as many as 200 pigs of the same weight and grade. After the time a feeder pig leaves the scales, the producer has no way of knowing which is his. He is paid on the basis of the number of pounds credited to him for each lot of pigs—at the price paid for that lot.

During the actual sale, which rarely lasts for more than an hour and a half, buyers are allowed to bid on large lots of feeder pigs at like grade and size. In this way, they are able to buy lots of pigs to meet their needs, which will all be ready to market as slaughter hogs at approximately the same time.

This is one reason why buyers are willing to pay more money for pigs purchased from these sales.

Sales like this one in Courtland are the result of marketing improvement work performed by the Virginia Agricultural Department's Division of Markets under S. Hollis Shomo, director.



"Twenny-one 'n quarter in the corner." Graham Buchanan of the Virginia Market Expansion Section, acting as ringmaster, helps to identify bidders during the highly competitive activity of the auction. Below, Bob Parker, a hog feeder, looks over some of the pigs that he bought at the sale. These hogs will be fattened and sold for slaughter.



Federal funds under the Agricultural Marketing Act, matched by State funds, were first obtained by the State in 1957, and a series of slaughter hog sales were conducted. These sales were designed to improve the quality of hogs produced by Virginia hog farmers and feeders—and, in turn, to raise the prices producers would receive—by providing premium prices for quality graded hogs as an incentive.

This was accomplished.

During 1957, only 43 percent of the hogs graded in Virginia rated U.S. No. 1. In 1958, however, more than 61 percent of Virginia hogs qualified for the top USDA grade.

This improvement in grade brought Virginia producers an additional \$27,000 for their hogs during the first seven months of 1958.

The slaughter hog marketing program soon led to the feeder pig program, initiated in 1958 with the Courtland sale, and eventually to a series of commercial gilt and boar sales which began in the spring of 1962, also in Courtland.

"During 1961," Virginia Markets Division Director Shomo has reported, "Virginia feeder pig producers selling through special pig sales received an average of \$4.25 more per head than producers selling through regular markets.

"This means that these producers received \$73,163 more in 1961 and \$154,003 more between 1958 and 1961, than they would have received if the marketing improvement program hadn't been initiated.

"In 1961," according to Shomo, "more than 17,000 graded and vaccinated feeder pigs were sold through 32 different sales in seven locations over Virginia."

Now, in order to produce better feeder pigs, the Division of Markets is initiating a series of commercial gilt and boar sales, producing grades of breeder stock which, it is felt, will eventually result in better feeder pigs—and still better profits to swine producers.

The first boar and gilt sale was conducted March 14 of this year in Courtland, under auspices of the Tidewater Livestock Sales Pavilion, the same producer cooperative which conducts the Courtland Feeder Pig Sale.

A total of 225 head of gilts was sold at an average price of \$62.12. Only U.S. No. 1 hogs were sold—subgraded into Classes A and AA.

Behind all of this activity in better marketing of swine in Virginia is a little-known program—the Matching Fund marketing service program, established by the Agricultural Marketing Act.

Under this program, Federal and State funds are combined in order to provide a practical marketing service at the State level. Latest marketing research findings are translated and put into practice in actual marketing situations for the benefit of producer, processor and distributor.

The program is administered at the Federal level by the Matching Fund Program Staff of AMS, whose director is George H. Goldsborough.

Proposed market improvement projects by various States are screened by this staff and funds are allotted each State in accordance with (1) the need for such improvement programs; (2) the effectiveness such activity might have in bettering marketing, and (3) funds available under the Act and from the State agricultural departments.

Forty-three States now cooperate in this program, adding Federal funds to their own appropriations in a local effort to improve marketing conditions.

All actual market improvement activity is conducted by State agencies, with regular determination by the Matching Funds Program Staff that the activity is worthwhile and in accordance with the law and with the latest research findings and the best known practices.

"The advantage of this type of Federal-State cooperation," according to Matching Fund Director Goldsborough, "is that the Federal funds serve as a catalyst to stimulate local solving of local problems.

"We in AMS and its Matching Fund Staff do not take credit for much of the benefits accrued under this program. This credit belongs primarily to the States doing the work. But we do take pride in the fact that this activity is conducted with aid of the U.S. Department of Agriculture and under the rigid standards set up by USDA."

The Virginia feeder pig improvement development is only one of the many projects now underway in the field of marketing improvement.

Similar projects over the Nation are being conducted in the marketing of fruits, vegetables, livestock, grains and nearly every field in agriculture.

Throughout all this program of practical research and application in marketing improvement runs the thread of cooperation—Federal-State cooperation in bettering the marketing ability of the American farmer—through wholehearted, positive activity by State departments of agriculture and the AMS Matching Fund Program.

Two of the men most responsible for the feeder pig program are E. A. Davis (left), Southampton extension agent, and Horace Mackey, Virginia Department of Agriculture.



New laboratory aids

POULTRY INSPECTION

NEW central laboratory facilities are now permitting the Agricultural Marketing Service's Poultry Inspection Service to move ahead in accomplishing some of the functions that are basic to the job of inspecting poultry to assure that it is safe, wholesome food.

Maintained by the Inspection Branch of the AMS Poultry Division, the new laboratory is located at the National Agricultural Research Center in Beltsville, Maryland.

The new facilities at Beltsville—occupying 2,040 square feet of floor space—permit laboratory personnel of the Inspection Branch to expand the number and types of tests they conduct. Within the building are pathology, chemistry, and bacteriology laboratories, as well as office space. There is also a fourth laboratory containing a refrigeration unit, deep freeze for storing specimens, and a dark room.

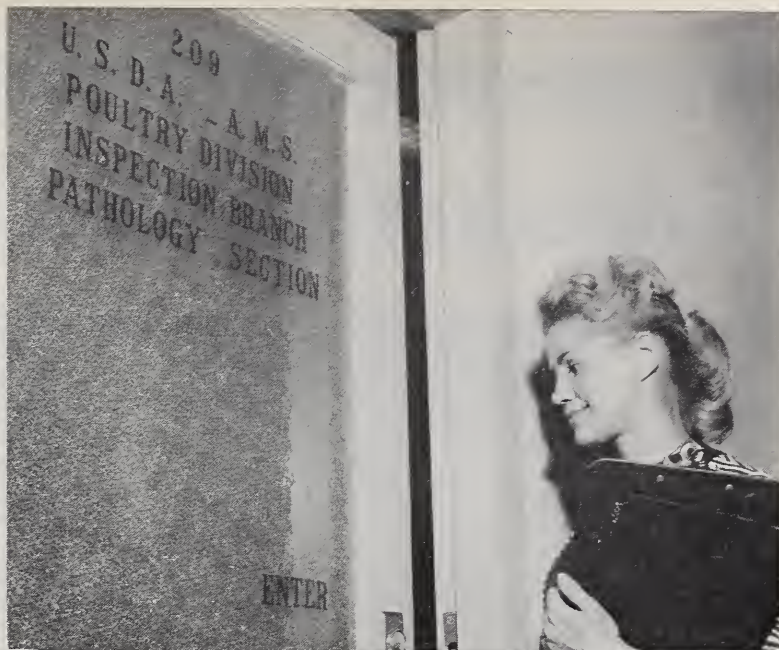
Facilities are available for expanded investigations of diseased poultry tissues and whole carcasses, more effective testing of chemical compounds used in connection with poultry processing operations, and sample checking of further processed and imported poultry products to determine their fitness for food.

In addition, the facilities permit testing of poultry products to determine whether they contain added moisture beyond what is necessary in processing to provide consumers with a clean, wholesome product.

New laboratories maintained by the Meat Inspection Division of USDA's Agricultural Research Service are housed in the same building. Both Meat Inspection and Poultry Inspection units share such facilities as autoclaves for sterilizing, utensil and glassware washers, and equipment for preparing media.

As part of their work, members of the poultry inspection laboratory staff help determine the criteria under which more than 1800 trained Government veterinarians and lay inspectors—stationed in poultry plants throughout the Nation—perform their inspection duties.

Vital to the nation's consuming public and to the poultry industry, the Federal Poultry Inspection Service is now responsible for the inspection for wholesomeness of more than 80 percent of all poultry moving off United States farms.



New quarters and facilities at Beltsville, permit poultry inspection laboratory personnel to expand number and types of tests made. Above, members of staff perform tests in pathology laboratory. Below, Dr. G. S. McKee, Head, Pathology Section, Inspection Branch, Poultry Division.



Improved Methods for Eviscerating Chickens

By Harold D. White, Rex E. Childs, and Roger E. Walters

THE number of commercial broilers produced in this country since 1940 has mushroomed from 143 million to the astronomical figure of nearly two billion in 1961. This rapid expansion has forced poultry processors to be constantly on the alert for new methods and equipment which will increase the level of efficiency in their entire operation.

To aid processors in improving methods and equipment for preparing ready-to-cook chickens, researchers from the College Experiment Station, University of Georgia College of Agriculture, and marketing researchers from USDA's Agricultural Marketing Service are conducting a number of joint studies dealing with the development of improved work methods and equipment for processing chickens. A recent report deals exclusively with methods of increasing the level of efficiency in the eviscerating area of the processing operation.

Field studies for the report were conducted in over 30 poultry processing plants in Georgia, Alabama, Maryland, Delaware, and Maine. In addition, a number of plants in Mississippi, Arkansas, and Texas were visited to verify the eviscerating methods studied.

Beginning with shank removal, which is normally considered the first eviscerating operation, the report explains how poultry processors can reduce costs at almost every work station in the eviscerating area by reducing labor requirements, decreasing the amount of edible products thrown away, and by more effective maintenance of product quality.

In their studies, researchers discovered a "least efficient" and a "most efficient" method of performing seven of the operations common in the eviscerating process. In a plant which processes an average of 30,000 chickens daily, the difference in cost of operation between the least and most efficient methods in these seven eviscerating stations results in potential savings of nearly \$100 per day. Although this reduction in daily operating costs appears small, it can amount to approxi-

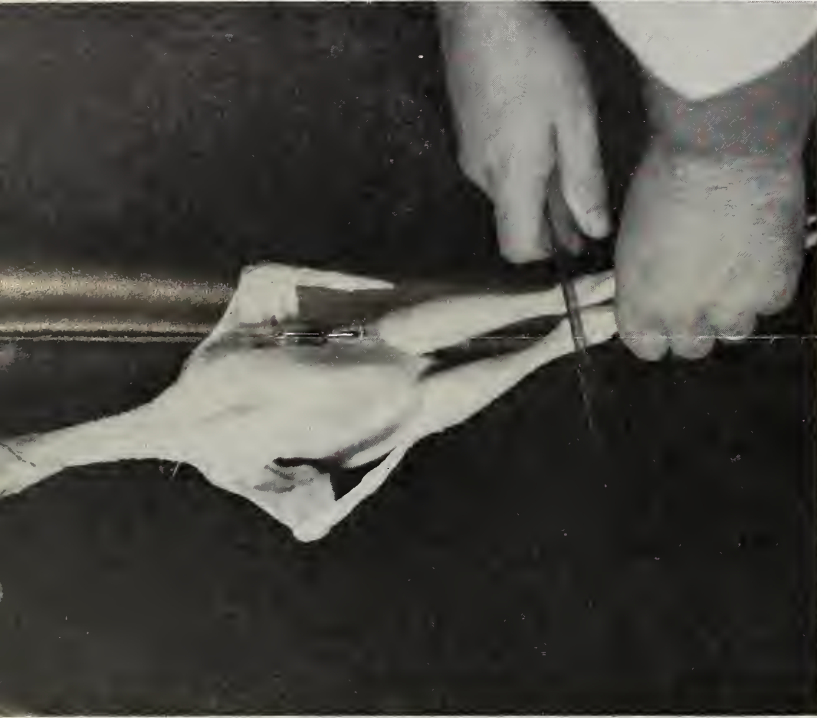
mately \$2,500,000 annually when based on high activity in about 100 U.S. plants operating on this production level. In addition to these savings on specific operations, the combinations of work methods, equipment and crew that are developed in the other eviscerating operations can yield further reductions in costs amounting to as much as \$15,000 annually for each high-volume plant.

Since the Poultry Products Inspection Act became effective in 1959, Federal inspection has become one of the stations in the eviscerating operation. To maintain maximum efficiency, it is important that the Federal inspector be able to perform his operation at the same rate of speed as the other eviscerating operations. Thus, a favorable environment for inspection and trimming should be established by (1) eliminating unnecessary movements, (2) reducing essential movements to a minimum, (3) providing sufficient, properly directed light, (4) providing carcass and viscera position that permits visual inspection of a maximum number of items with a minimum amount of movement, and (5) providing for equipment arrangement of the trim station that permits maximum trimmer assistance to the inspector.

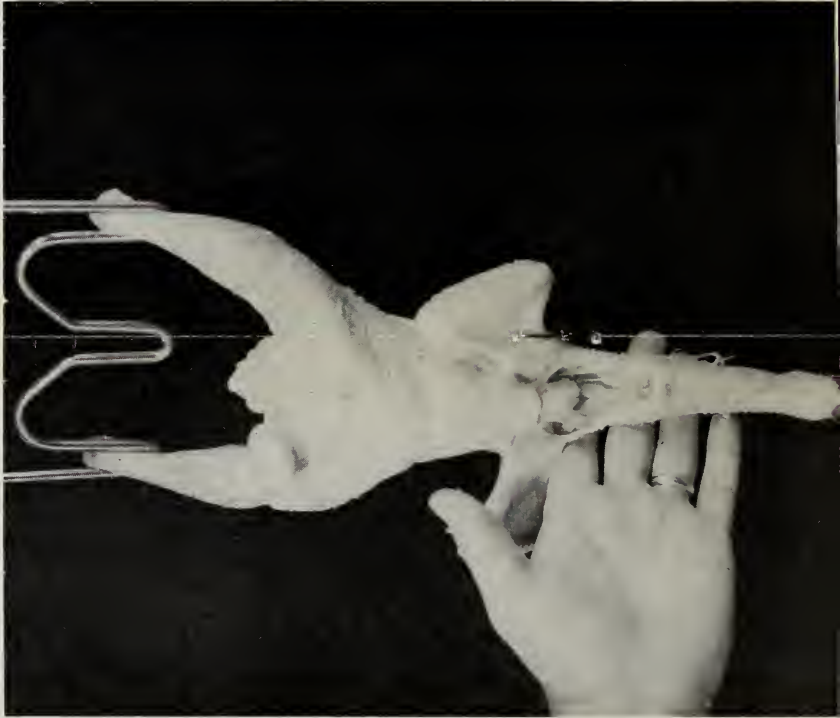
After having examined each operation in the eviscerating process, researchers have established these basic conclusions, which should help processors reduce costs at practically every work station:

- Shanks can be removed about 50 percent faster when chickens are suspended by the neck and the removal cut is made with a knife, than when the chickens are suspended by the feet and the cut is made with a shears.
- The best method for transferring dressed birds from the defeathering line to the eviscerating line depends on the type of picking equipment, the methods of performing other operations adjacent to the transfer point, and the type of eviscerating conveyor used. In most cases, it is more economical to transfer birds directly from neck suspension on

(continued on page 16)



When shanks are removed by knife, the bird should be high enough so that the cut is made with a natural, horizontal hand motion. Below, a carcass with the neck vertebrae severed and lowered permitting removal of crop and windpipe.



Removing lungs by vacuum, open-flow-type nozzle.



An eviscerating line loaded with birds moves along just over the giblet supply belt, and workers select a set of giblets, wrap them, and stuff package into body cavities.

Plant Disease Control Without Chemicals

By HAROLD T. COOK

(Editor's note: The following address was given by the author when he retired as president of the Botanical Society of Washington in December 1960. The speech was also printed in the February 1961 issue of the Washington Academy of Sciences. Dr. Cook is Deputy Director, Marketing Quality Research Division, Agricultural Marketing Service, USDA.)

The title may suggest that the subject of this paper was chosen because of the current interest in pesticidal residues and food additives resulting from the recent amendments to the Food, Drug, and Cosmetic Act and the cranberry episode of 1959. Actually, my interest in plant disease control without chemicals antedates the present furor over pesticidal residues by about 30 years.

Fungicides are useful and necessary for control of some plant diseases, but too often plant pathologists resort to them when other methods may be more effective, practical, and economical. Ever since the discovery of bordeaux mixture by Millardet in 1882, fungicides have played a major role in plant disease control. Their use has been accelerated in recent years by extensive commercial advertising and a vast army of salesmen.

Disillusionment about standard chemical treatments came early in my professional career. Soon after I became plant pathologist at the Virginia Truck Experiment Station in 1930, I was directed to revise the Station bulletin on sweet potato diseases. Since I had never seen a sweet potato except on the dinner table, I put my trust in recommendations in farmer's bulletins and experiment station bulletins.

I recommended treating the seed potatoes with bichloride of mercury and warned in boldface type how to handle the deadly poison. I recommended coating the bottom end of each sprout with copper or sulfur dust before planting. And finally, I recommended fumigating the storage house with formaldehyde or spraying the walls and floors with copper sulfate solution,

whitewash, or lime-sulfur.

These were standard recommendations, but they didn't control disease in demonstration plots I planted to show farmers how to grow healthy sweet potatoes. Later I found why the chemical treatments didn't work, and developed nonchemical methods that were more effective and practical.

There are many advantages to nonchemical methods for controlling plant diseases:

1. They are often cheaper, since there is no cost for fungicidal materials and equipment and labor for applying them.

2. They are often more practical, since it is difficult or impossible to spray or dust at frequent and regular intervals.

3. Mechanical injury by sprayers and dusters is avoided.

4. Chemical injury by fungicides is avoided.

5. There are no unsightly or toxic residues.

6. Disease control is sometimes more complete.

The nonchemical methods for plant disease control are based on rather simple and basic principles:

1. Elimination of the microorganisms that cause disease by hot water seed treatment, heat treatment of vegetative parts, growing seed in dry areas where the disease does not develop, propagation methods that remove diseased parts, and sanitation.

2. Preventing infection by avoiding injuries and promoting formation of natural barriers to infection.

3. Retarding infection and development of disease by refrigeration and controlled moisture.

4. Planned marketing so that products are used before spoilage occurs.

5. Use of disease-resistant varieties.

There are numerous examples of plant disease control by these methods. Some are so firmly established that they are taken for granted. Time will permit discussion of only a few.

Bean anthracnose was the most serious disease of beans in States east of the Mississippi until 1927. Numerous attempts to control it by chemical seed

treatments and field sprays failed. Breeding for resistance was complicated by the existence of three strains of the fungus. The disease has been almost completely eliminated since 1927 simply by growing disease-free seed in the arid western States where the air is too dry for the fungus to develop on the seed pods and infect the seed. Previously, much of the bean seed was grown in Michigan and western New York, where the weather was often favorable for anthracnose.

Bacterial blight is another seedborne disease of beans that is controlled by growing seed in western States, especially in certain parts of California. Numerous wet and dry chemical seed treatments were tested before this simple and effective control was found.

BLACK ROT is an important disease of cabbage and related crops. For many years, treating the seed with bichloride of mercury was recommended, but only incomplete control was obtained. Research showed that some seed is internally infected so that chemical treatment could not be expected to be effective. Hot water seed treatment gave complete control, but was not practical for treating large volumes of seed. Fortunately, hot water seed treatment is no longer necessary because most of the seed is now grown in Pacific Coast States where it does not become infected.

Blackleg, another cabbage disease that was formerly important, also has been nearly eliminated by using western-grown seed.

Celery is sprayed weekly from the time the plants come up until it is harvested, to control the leaf blights. It is a costly and messy operation and does not control blight satisfactorily in bad years. Much trimming and washing are necessary to remove spray residue before marketing. These celery diseases may be controlled and the need for spraying eliminated by treating the seed with hot water and crop rotation. Chemical seed treatments are only partly effective because the fungi are within the seed coat.

The effectiveness of hot-water seed

treatment was strikingly demonstrated in commercial plantings at Norfolk, Va., in 1941. Blight had caused heavy losses there in 1940. The next season, six of the nine growers accepted the Experiment Station offer to treat their seed. Blight destroyed the celery of the three growers whose seed was not treated. Four of the growers using treated seed had no blight. The other two had blight only in the beds where they used plants obtained from neighbors whose seed was not treated.

Hot water and hot air treatments of vegetative parts have been used to control virus diseases of peaches, cranberries, and sugar cane, red rot of sugar cane, and black rot of sweet potatoes.

Black rot is a major disease of sweet potatoes. Some may be found at harvest, but usually infection is not noticeable until several weeks later. Sweet potatoes that are washed before packing may be infected by spores in the wash water. Black rot that develops during transit may make the entire lot unsalable when it reaches the market.

Standard recommendations for black rot are to discard seed potatoes with black rot and to treat the remaining ones in bichloride of mercury. This treatment kills black rot spores on the surface but not the fungus in the spots. Spotted potatoes that escape detection and are bedded produce diseased sprouts and cause black rot in the next crop.

An easier and more effective way to control black rot is to cut the sprouts above the seedbed soil line instead of pulling them. Since black rot occurs only on the underground stem, only the healthy part is planted. Sprout cuttings live and yield as well as field sprouts.

Scurf is another major sweetpotato disease that may be easily eliminated by planting sprout cuttings. Chemical seed and sprout treatments that have been recommended have little effect on scurf.

SANITATION is an effective control measure and need not involve chemicals. Fumigation of sweetpotato storage houses with formaldehyde is still recommended. It is an expensive and unpleasant task and I don't know of any experimental evidence to justify it. Thorough sweeping or washing down of the storage will probably do as much or more good.

Preventing infection is important in controlling many market diseases. Once the pathogen has entered the fruit or vegetable it is beyond reach of most fungicides.

Many years ago, U. S. Department of Agriculture workers showed that much

decay in California oranges started as mechanical injuries that occurred during harvesting, packing, and shipping. Fruit with no apparent injury when packed had only 1.8 percent decay at destination in contrast to 26.9 percent in visibly injured fruit. Improved handling has markedly reduced decay in commercial shipments without the aid of chemicals.

HEATING, chilling, and freezing may cause physiological changes and physical damage that are followed by decay. Alternaria decay of tomatoes, peppers, and acorn squash, and penicillium decay of sweetpotatoes, are examples of decay that follow chilling injury. Unchilled tissues are not affected by these fungi, but decay develops rapidly after chilling.

Chilling injury occurs in tomatoes and sweet potatoes below 55° F., and in acorn squash and peppers at 45° or lower. Chemical treatments give little if any protection. The logical remedy is to avoid exposure to conditions that cause such injury.

Formation of natural barriers in injured tissues prevents decay in potatoes and sweetpotatoes. These vegetables are unavoidably cut, broken, and skinned during harvesting, cleaning, and packing, but the injured tissues heal and wall out the decay pathogens in potatoes that are kept at 70° F. or higher in a humid atmosphere. These healing properties are utilized to prevent soft rot and browning of new potatoes during transit. Instead of using low temperatures to check decay, moderate temperatures are maintained in the rail cars so that injured tissues will heal.

Healing also is used to reduce seed piece decay before and after planting. Chemical treatments are unnecessary and may interfere with healing and increase decay.

Curing sweetpotatoes at 85° F. in a humid atmosphere after harvest gives excellent control of rhizopus rot. Recuring the potatoes after they are washed and packed for market is a promising method of reducing decay in transit and at the market.

Refrigeration controls many post-harvest diseases. But the amount of refrigeration that may be used depends on the fruit or vegetable. Some may be stored at 32° F. but others, like tomatoes, are injured and made more susceptible to decay by chilling temperatures considerably above freezing. The temperatures used must be tailored to the particular fruit or vegetable.

Temperatures below 40° are safe for oranges and retard penicillium and stem

end rots. Rhizopus causes no visible decay in peaches after six days at 45°, but 36° is necessary to retard brown rot an equal amount.

Research has shown that rhizopus decay in cannery peaches can be reduced from 4.7 percent to 0.5 percent simply by storing the fruit at 31° F. for 14 days before ripening instead of ripening immediately. Canners get two or three more cases per ton when peaches are handled this way. Chemical treatments failed to give satisfactory decay control.

Humidity control is important for controlling disease. Aeration is a practical method of reducing moldiness in stored grain. Fungicides are not effective, and, if they were, would leave undesirable residues. Prompt drying and maintenance of low humidity are especially important to prevent heavy losses from onion neck rot.

Free moisture favors decay of stored root crops. Crater rot, rhizopus, sclerotinia, and botrytis decays cause serious damage to carrots that are continuously wet by water dripping from overhead brine coils. Such decay has been almost completely eliminated in some storages simply by erecting a kraft paper awning over the carrots to shed the water.

PLANNED marketing based on the predicted keeping quality of different lots of fruits or vegetables reduces disease losses. Decay during storage varies in different lots of California grapes. More decay occurs in grapes from some vineyards than others, and in grapes harvested soon after rainy periods. The grapes that will have least decay in storage may be identified soon after harvest by placing samples of each lot under conditions that accelerate decay. This makes it possible to market lots that will decay badly if stored too long, while they are still in good condition.

Some California grape producers have used this method as a marketing guide for several years. A similar method is being used to forecast bull's-eye rot in stored northwestern apples.

Plant disease control by uses of disease-resistant varieties is well established. It is a very effective method, but many years are required to develop an assortment of desirable resistant varieties, and progress is frequently nullified by the appearance of new strains of the pathogenic fungi.

I have cited only a few examples of successful plant disease control without chemicals. There are many others. Many diseases now unsatisfactorily controlled by chemicals would probably respond to nonchemical methods.

SHOULD CHEESE BE PACKAGED STORES OR IN CENTRAL

By GORDON FLYNN

WHERE is the most economical place to package and price bulk cheese—at the warehouse or in the retail store?

That's a question which has been kicking around for years. Now, researchers of USDA's Agricultural Marketing Service have come up with what may well be the answer. They have found that, depending on the volume and type package and equipment used, if cheese is packaged at the central warehouse, there are potential yearly savings for one chainstore firm of anywhere from \$4,600 to \$12,800.

When packaged in the retail store, cheese is typically cut into consumer units with a wire. It is next packaged at a wrap station, the film is sealed and partially shrunk on a "Teflon" covered heat plate, and the package then moved to the scale for weighing and labeling. The type of film used in this study was a polyvinyl chloride which has shrink characteristics. The cost of packaging cheese manually in the store was 3.9 cents a pound and 3.1 cents in the central warehouse.

The method of packaging, and type of cheese package, at the central warehouse depends on several factors. If a variety of package weights is desired, the use of automatic equipment is, obviously, limited. If more than 10 to 15 days of shelf life are required, then the package must be "vacuum" or "gas flush" packaged. With high volume, an automated line becomes more econom-

ical. When cheese is packaged "catch weight," it typically is manually wrapped, since available packaging machines cannot adjust to various package sizes.

In this study by AMS marketing researchers, the cheese was cut on a hydraulically operated wire-cutting jig. It was fed to the individual wrap stations by conveyor. The wrappers pulled the film off of a roll, estimating the size of film (polyvinyl chloride) required for each package. The package was wrapped, sealed on a low temperature seal plate, and placed on a conveyor.

The wrapped packages passed through a heat shrink tunnel to better seal the film and make it skin-tight. The packages were then weighed and labeled on a combination electronic computing scale and automatic labeler. The automatic labeling machine can handle all rectangular packages, which account for 73 percent of the total. Other packages, such as half-moons and wedges, are manually labeled. The packages are then accumulated on a turntable and packed in returnable master containers.

When increased shelf life is required, and "even-weight" packages are acceptable, automatic equipment can be utilized. In the operation which is typically used both at central warehouses and in packaging plants, the cheese is "gas flush" packaged. Air is removed from this type package and replaced by nitrogen or carbon dioxide gas.

The cheese is cut on automatic cutting jigs and then placed on the conveyor leading to a wrapping machine where the package is automatically wrapped. Random packages are removed from the line and immersed in water to check the seal.

Where the packages are "unit-priced" (all the same value), the pricing is automatic. When catch-weight pricing is used to reflect the slight variation in package size permitted by automatic packaging equipment, the packages can be conveyed across the electronic computing scale and automatic labeler. This packaging line will operate at a rate of from 40 to 50 pieces per minute. When the packages are individually priced in central plants the cost is 3.6 cents each per pound.

Costs for the manual warehouse cheese-packaging operations are less than store costs for several reasons: The cheese is cut on a machine, the wrappers are more skilled, the package is automatically priced, and there is generally better supervision.

The automatic cheese packaging line performs the wrapping and pricing automatically, hence labor costs are comparatively low. The high film costs for the automatic packaging line are to some extent justified by the increased shelf life of the cheese.

A new machine for automatically packaging cheese, using the same type film (polyvinyl chloride), has about the same labor cost as automatic "gas flush" packaging in the warehouse, but has

IN RETAIL WAREHOUSES?

lower fixed charges.

The machine can wrap only rectangular packages, and packages which vary no more than one ounce in weight. The packages have a shelf life of 10 to 15 days. Packaging cost per pound is 2.3 cents.

When deciding where and how cheese should be packaged, the firm can be guided by the following limitations: If a variety of sizes is desired, cheese will (1) have to be manually wrapped, or (2) have several production runs for each item with different weights on each run. (This complicates order filling.) If a long shelf life is required, the answer is the "gas flush" automatically-wrapped package. If the firm can use an even-weight package, and limited shelf life, the newly developed wrapping machine will give the lowest cost.

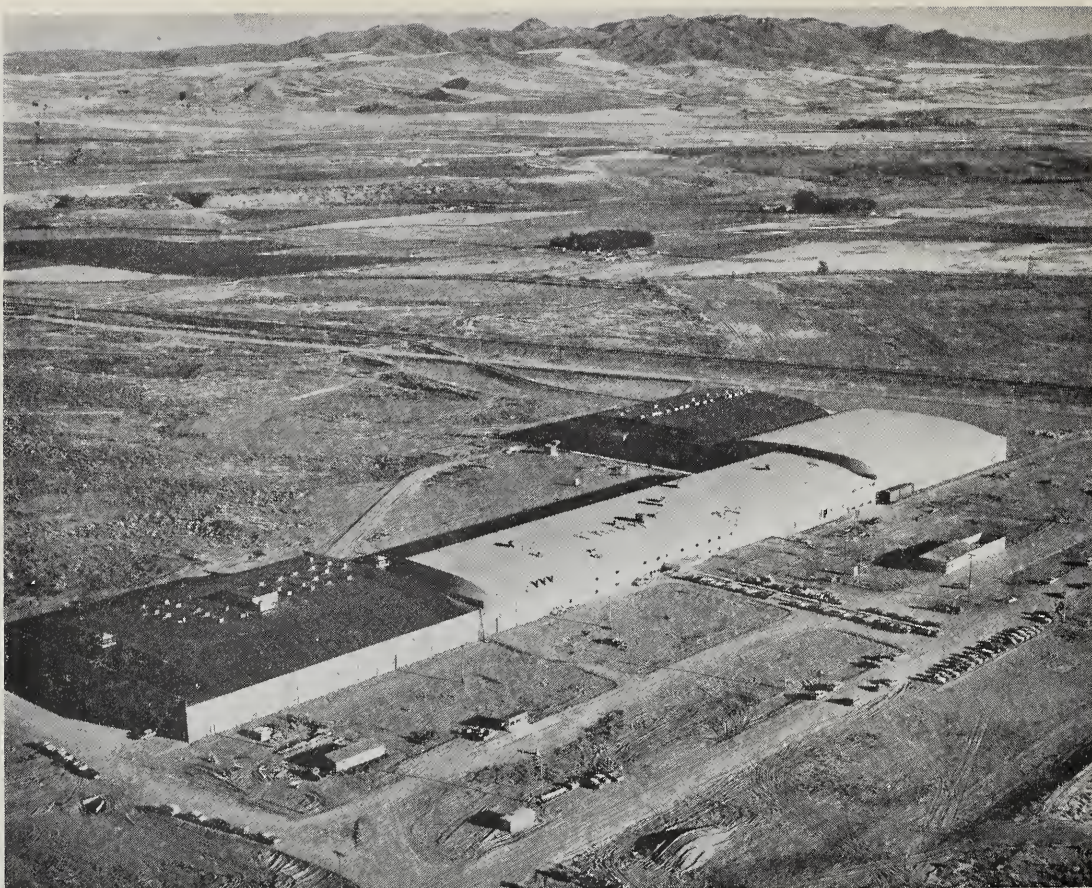
There are other less tangible benefits from central cheese packaging: (1) It is easier to maintain full displays, (2) the store can handle a wider variety of items, since it can order in smaller quantities, (3) the warehouse can purchase cheese in larger units, thus reducing costs and the cutting time; (4) stores normally package a week's supply of cheese on Monday or Tuesday. When cheese is packaged centrally, stores can order two or three times a week, and so decrease the shrink by reducing the time between packaging and sale.

(The author is a staff member of the Wholesaling and Retailing Research Branch, Transportation and Facilities Research Division, AMS.)



A marketing research study by USDA's Agricultural Marketing Service showed that costs for the manual warehouse cheese-packaging operations (bottom) were less than store packaging.





Aerial view of a potato packing and processing plant. At left, the raw potato storage; center, processing section; and right, zero storage section. Railroad and highways are nearby.

Plant Packs Fresh and Processed Potatoes Under Continuous Inspection by U.S.D.A

By F. L. SOUTHERLAND

THE Lamb-Weston potato packing and processing plant at American Falls, Idaho, is in its second year of operation and also in its second year as the only plant in the country packing both fresh and processed potatoes under continuous inspection of the U. S. Department of Agriculture.

In one integrated operation at American Falls, this firm packs graded and sized potatoes for the fresh market, frozen French fries, and dehydro-frozen flakes for making instant mashed potatoes.

Even before the new plant was completed, this firm applied to USDA's Agricultural Marketing Service for continuous inspection on both its fresh packing line and its processing opera-

tions. And, from the beginning, the firm has used "U.S. Grade A" and "U.S. No. 1" labels, and the legend "Packed under continuous inspection of the U.S. Department of Agriculture."

This new plant features three units: A raw-product warehouse which will hold half a million hundredweight of potatoes in temperature-and-humidity-controlled comfort; the processing plant, which is 620 feet long and 120 feet wide; and a subzero storage building 240 feet wide and 300 feet long.

As trucks bring potatoes into the warehouse in bulk loads, an AMS inspector inspects each load to determine its grade and size composition. The inspection certificate issued on each load is the basis on which the grower is paid. The potatoes are then stored in the

warehouse until they are needed.

As they are brought out of the warehouse, all the potatoes move over the grading line and are weight-sized in specially adapted equipment.

The "bakers" are carefully sorted by quality, shape, and weight, and packed in 50-pound cartons. Potatoes which will be made into French fries or dehydro-frozen flakes are first put into a lye-steam peeler, to remove the skins. Then the smaller potatoes head for the French-fry line, where they are shot lengthwise through a patented "water gun" into a set of stationary knives that slice them into French-fry cuts. The cutter produces uniform cuts from the center of the potato, while the outside slices are diverted to the potato-flake line. The larger potatoes go through crinkle cutters and come out

as crinkled French fries.

The dehydro-frozen potato flakes are marketed from freezer cabinets in grocery stores. Freezing eliminates the need for antioxidants and preservatives, so the only additive is a vegetable oil emulsifier to facilitate reconstitution.

Under its inspection agreements with Lamb-Weston, USDA's Agricultural Marketing Service keeps inspectors in the plant during the entire time the lines are running. The company pays the cost—and gets the services of impartial experts on U.S. grade standards, who run continuous quality control checks on the entire packing operation.

The inspectors make sure that the fresh potatoes labeled "U.S. No. 1" or "U.S. Fancy," and the frozen French fries labeled "U.S. Grade A" meet those standards.

The fresh potato inspector, for instance, functions as an "umpire" to make sure the sorters are staying within the "strike zone"—selecting only potatoes that will meet the quality specifications. Since the inspector is right on the spot, he can keep the plant advised continually on the quality of the pack.

The processed potato inspector keeps a watchful eye on the various steps in the processing, checking the texture of the French fries as they emerge from the blanchers, their color as they pour from the fryers, temperature of the blast freezer, and all the other steps in the processing operation.

He, too, warns the foreman when one of the quality factors is getting close to the borderline, giving him time to correct it before the quality of the product is impaired.

PLANT sanitation is heavily stressed under continuous inspection. The plant's facilities had to meet rigid sanitation requirements before the inspection contracts were signed. Now the inspectors make daily checks on all the packing and storage areas, and examine all the equipment. Their daily report goes immediately to the plant management for any remedial action that may be needed.

What is the result of all this careful inspection? Lamb-Weston is able to offer its customers packages that carry an assurance of wholesome high quality—the U.S. Grade label and a shield bearing the legend, "Packed under continuous inspection of the U.S. Department of Agriculture."

(The author is Deputy Director, Fruit and Vegetable Division, Agricultural Marketing Service.)

NEW PRODUCTS HELP TO INCREASE U.S. CONSUMPTION OF POTATOES

NEW potato products are helping to pull potato consumption up after a long-term downtrend, say specialists in the U.S. Department of Agriculture's Economic Research Service. In 1956, each American ate an average of only 108 pounds of fresh and processed potatoes. Last year, he used nearly 114 pounds. At the same time, use of processed potatoes, roughly 28 pounds per person last year, is almost double the amount used in '56. Although only about a fourth of total consumption, processed potatoes have been a big part of the upswing in potato use.

Processed potato products such as dehydrated mashed potatoes or frozen French fries have given housewives good reasons for liking them.

The indications are that processed forms are equal, or nearly equal, to fresh potatoes on color, comparative cost of servings, texture, and flavor. However, quality sometimes varies from brand to brand and this should concern the industry—it may discourage the housewife from buying processed kinds of potatoes.

Meanwhile, increased per capita use of processed potatoes has stepped up growers' gross returns as much as \$14 to \$17 million for the 1960-crop. They

received similar, although smaller, benefits on the 1957, 1958, and 1959 crops.

Another encouraging note to growers is that processing has provided an outlet for more of the potato crop in some areas. Fresh shippers generally want just the higher grades and, up to 1956, there was only a limited market for sound potatoes of odd sizes and external defects which now can be used in processing.

CONSUMERS should be seeing more new forms of processed potatoes from time to time—they're needed by the industry to maintain financial growth. A firm's profits are the largest when a new product is first catching on—consumers try it out, like it, and sales pick up rapidly.

However, the attractive profits encourage other firms to come into the business. Production increases faster than consumption and profit margins narrow. This has been the pattern in the potato industry recently.

So in order to keep profits up, the processor must constantly seek new products. At the same time, more new kinds of processed potatoes could mean additional money in the grower's pockets.

A USDA inspector uses models to help determine the grade of frozen french fries. This service provided by USDA helps guide consumers in selecting quality they want.



Food Stamp Program Offered to New Areas

AN additional expansion has been announced for the Pilot Food Stamp Program, which increases the food purchasing power of low-income families, enabling them to buy more and better food from regular retail stores.

The program is being offered to an additional 14 areas—mainly counties—in 12 States. If accepted by all areas to which it is now being offered, the program would cover a total of 45 counties and three cities in 23 States. This includes the areas to which it was offered last August and the areas in which it originated in 1961.

This additional limited expansion has been made possible following a complete review and analysis of the potential caseload and estimated costs of operating the program in areas already announced, it was explained by officials of the U.S. Department of Agriculture, which administers the program.

Because of the many administrative and educational activities necessary in setting up a food stamp program, the Department established March 1, 1963 as the target date for the first sale of coupons.

Areas designated by the latest announcement are: Walker County, Ala.; Humboldt County, Calif.; Rice County, Kan.; Perry County, Ky.; Avoyelles Parish, La.; Carlton County, Minn.; Santa Fe County, New Mex.; Mora County, New Mex.; Cuyahoga County, Ohio; Pushmataha County, Okla.; Pittsburgh, Pa.; Cambria County, Pa.; Yakima County, Wash.; and Iron County, Wis.

With no further expansion planned under the pilot phase of the program, the Department announced that these areas, like the others, were chosen from among those eligible for area redevelopment assistance or which have been experiencing above-average unemployment for some time, and which offer varying conditions for testing the program.

A NEW WEEKLY

JANUARY 1963 will mark the debut of a new weekly magazine, *Foreign Agriculture*, which will report and interpret foreign agricultural production, markets, programs and policies. This new weekly represents the merger of the 26-year-old monthly, *Foreign Agriculture*, and *Foreign Crops and Markets* which has appeared each week for 43 years.

The new weekly will stress news on world agricultural matters which are of direct interest to U.S. producers, traders, and all others who have an immediate stake in world-wide agricultural commerce.

Subscriptions are available through the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C. (Cooperators and disseminators of information eligible for the new weekly's free mailing list should write to the Foreign Agricultural Service, Room 5918, United States Department of Agriculture, Washington 25, D.C.)

CHICKENS

(continued from page 8)

the defeathering line to hock suspension on the eviscerating line.

- About one dollar's worth of edible product per thousand birds processed can be saved by removing the oil gland with the bird suspended by the hocks rather than by the neck. Weight loss can also be reduced considerably if abdominal fat is left attached to the bird carcass rather than being removed with the viscera.

- Federal inspectors can inspect poultry more effectively if plant management provides an adequate inspection

station, presents the bird in the proper position for inspection, and sees that all operations are performed prior to inspection.

- In high volume processing plants (3,000 or more birds per hour) hearts and livers can be harvested and trimmed with about 25 percent less labor if both parts are removed and trimmed by the same operator. Even though high maintenance cost is involved and some additional labor is required for peeling, gizzards can be split and washed cheaper by automatic splitter than by hand splitting and washing.

- Lungs and reproductive organs can be removed more efficiently by vacuum equipment than by hand rake. A vacuum system with shut-off type nozzle allows an operator to remove lungs and reproductive organs from 3.4 birds per minute more than if an open flow type nozzle is used.

- The crop and windpipe can be removed about 50 percent faster if the operator first severs the vertebra instead of making a horizontal slit in the neck skin for an opening.

- Giblets can be wrapped and stuffed into warm carcasses at a rate of one bird per minute more than when stuffed into chilled carcasses.

These recommendations merely summarize the findings in the research report. More detailed information on increasing efficiency in the eviscerating operation can be found in Marketing Research Report 549, "Methods and Equipment for Eviscerating Chickens." Single copies can be obtained by writing to the Office of Information, USDA, Washington 25, D. C.

(Rex Childs and Roger Walters are staff members of the Transportation and Facilities Research Division, AMS. Mr. White is an agricultural engineer with the College Experiment Station, University of Georgia.)